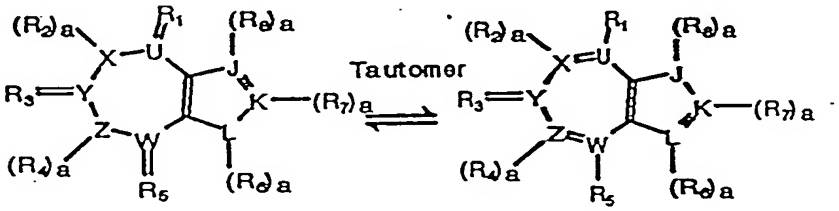
WHAT IS CLAIMED IS:

Claim 1. A method of treating a viral, bacterial, fungal or parasitic infection in a patient or vertebrate animal comprising administering to said patient or vertebrate animal in an amount sufficient to effect said treatment, at least one of potentially planar, aromatic, ring-expanded heterocyclic bases, nucleosides and nucleotide compounds having the structure



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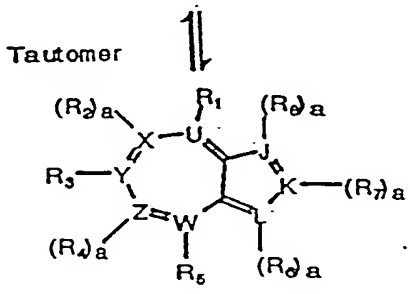


I (C)

wherein:

R_1, R_3 and R_5 are each independently selected from:

NH, NH_2, O, OH, S, and SH;

NH-alkyl, N-alkyl, O-alkyl and S-alkyl wherein the alkyl group is C_1-C_{20};

NH-aryl, O-aryl and S-aryl wherein the aryl group is a substituted or unsubstituted phenyl or heterocyclic group;

R_2, R_4, R_7, and R_8 are independently selected from the group consisting of hydrogen, C_1-C_{20} alkyl, substituted phenyl, unsubstituted phenyl, unsubstituted heterocycle, substituted heterocycle, aralkyl wherein the alkyl containing 1 to 6 carbon atoms and the aryl is substituted or unsubstituted;

R_6 is selected from the group consisting of

hydrogen,

C_1-C_{20} alkyl,

substituted phenyl,

unsubstituted phenyl,

unsubstituted heterocycle,

substituted heterocycle,

aralkyl wherein the alkyl containing 1 to 6 carbon atoms and the aryl is substituted or unsubstituted;

a glycosyl group selected from the group consisting of ribosyl, 2'-deoxyribosyl, 2'3'-dideoxyribosyl, 2'3'-dideoxy-2'-fluororibosyl, 2'3'-dideoxy-3'-fluororibosyl, 2'3'-dideoxy-2'3'-fluororibosyl, 2'3'-dideoxy-3'-azidoribosyl and mono-, di-, and triphosphate derivatives thereof;

$-(CH_2)_{m+n+1}-R'$

$-(CH_2)_m-O-(CH_2)_n-O-R'$;

$-(CH_2)_{m+1}-O-R'$;

$-(CH_2)_m-O-(CH_2)_n-R'$;

wherein R' is selected from the group consisting of: hydrogen, H_2PO_3, $H_3P_2O_6$, $H_4P_3O_9$, and alkali metal or alkaline earth metal salts thereof;

m is zero to 20, n is zero to 20, and a is zero or one;

U, X, Y, Z, W, J, K, and L are selected from the group consisting of C and N;

and all chiral forms and stereoisomers of said compounds.

Claim 2. The method of claim 1 wherein said infection is a virus infection.

Claim 3. The method of claim 1 wherein said viral infection is caused by a virus selected from the group consisting of human immunodeficiency virus, Human B lymphotropic virus, Herpes simplex virus, Varicella-zoster

virus, Epstein-Barr virus, necrotic rhinitis, Malignant catarrh, Allerton virus, Equine herpesviruses, Neurolymphomatosis, Influenza viruses, Parainfluenza viruses, Adenoviruses, Rheovirus, Respiratory syncytial virus, Rhinoviruses, Coxsackie virus, Echo viruses, Epidemic gastroenteritis virus, Rubeola virus, Hepatitis viruses, cytomegalovirus virus and Papovavirus.

Claim 4. The method of claim 1 wherein said viral infection is caused by Hepatitis viruses.

Claim 5. The method of claim 1 wherein said viral infection is caused by Hepatitis B virus.

Claim 6. The method of claim 1 wherein said viral infection is caused by Epstein-Barr virus.

Claim 7. The method of claim 1 wherein said viral infection is caused by cytomegalovirus virus.

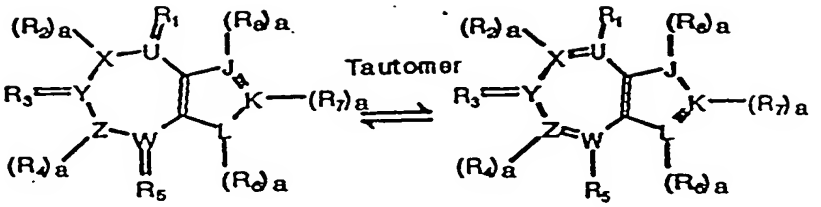
Claim 8. The method of claim 1 wherein said compound is administered subcutaneously,

intravenously, intramuscularly, intraperitoneally, orally, topically, or by a combination thereof.

Claim 9. The method of claim 1 wherein said at least one compound is administered in combination with at least one known therapeutic agent.

Claim 10. The method of claim 1 wherein said compound is in a therapeutic form of a pharmaceutically acceptable salt, phosphonate, ester or salt of said ester, which provides said compound or its therapeutically effective metabolite during said treatment.

Claim 11. A method of inhibiting the growth of cancer in a patient or vertebrate animal comprising administering to said patient or vertebrate animal in an amount sufficient to effect said inhibition, at least one of potentially planar, aromatic, ring-expanded heterocyclic bases, nucleosides and nucleotide compounds having the structure



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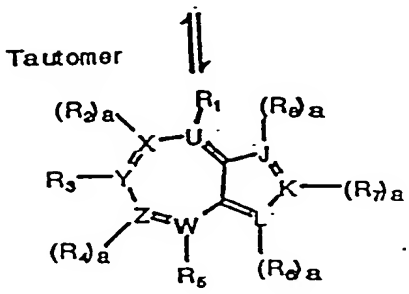


I (C)

wherein:

R_1, R_3 and R_5 are each independently selected from:

NH, NH_2, O, OH, S, and SH;

NH-alkyl, N-alkyl, O-alkyl and S-alkyl wherein the alkyl group is C_1-C_{20};

NH-aryl, O-aryl and S-aryl wherein the aryl group is a substituted or unsubstituted phenyl or heterocyclic group;

R_2, R_4, R_7, and R_8 are independently selected from the group consisting of hydrogen, C_1-C_{20} alkyl, substituted phenyl, unsubstituted phenyl, unsubstituted heterocycle, substituted

heterocycle, aralkyl wherein the alkyl containing 1 to 6 carbon atoms and the aryl is substituted or unsubstituted;

R_6 is selected from the group consisting of

hydrogen,

C_1-C_{20} alkyl,

substituted phenyl,

unsubstituted phenyl,

unsubstituted heterocycle,

substituted heterocycle,

aralkyl wherein the alkyl containing 1 to 6 carbon atoms and the aryl is substituted or unsubstituted;

a glycosyl group selected from the group consisting of ribosyl, 2'-deoxyribosyl, 2'3'-dideoxyribosyl, 2'3'-dideoxy-2'-fluororibosyl, 2'3'-dideoxy-3'-fluororibosyl, 2'3'-dideoxy-2'3'-fluororibosyl, 2'3'-dideoxy-3'-azidoribosyl and mono-, di-, and triphosphate derivatives thereof;

$-(CH_2)_{m+n+1}-R'$

$-(CH_2)_m-O-(CH_2)_n-O-R'$;

$-(CH_2)_{m+1}-O-R'$;

$-(CH_2)_m-O-(CH_2)_n-R'$;

wherein R' is selected from the group consisting of: hydrogen, H_2PO_3, $H_3P_2O_6$, $H_4P_3O_9$, and alkali metal or alkaline earth metal salts thereof;

m is zero to 20, n is zero to 20, and a is zero or one;

U, X, Y, Z, W, J, K, and L are selected from the group consisting of C and N;

and all chiral forms and stereoisomers of said compounds.

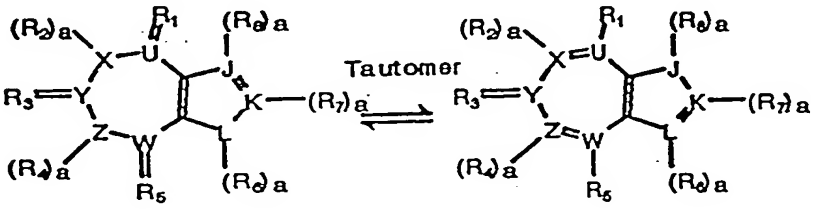
Claim 12. The method of claim 11 wherein said cancer is selected from the group consisting of leukemia, non-small cell lung cancer, colon cancer, CNS cancer, melanoma, ovarian cancer, renal cancer, prostate cancer and breast cancer.

Claim 13. The method of claim 11 wherein said compound is administered subcutaneously, intravenously, intramuscularly, intraperitoneally, orally, topically, or by a combination thereof.

Claim 14. The method of claim 11 wherein said at least one compound is administered in combination with at least one known therapeutic agent.

Claim 15. The method of claim 11 wherein said compound is in a therapeutic form of a pharmaceutically acceptable salt, phosphonate, ester or salt of said ester, which provides said compound or its therapeutically effective metabolite during said treatment.

Claim 16. A method of inhibiting enzymatic activity of RNA polymerases in a patient or vertebrate animal comprising administering to said patient or vertebrate animal in an amount sufficient to effect said inhibition, at least one of potentially planar, aromatic, ring-expanded heterocyclic bases, nucleosides and nucleotide compounds having the structure



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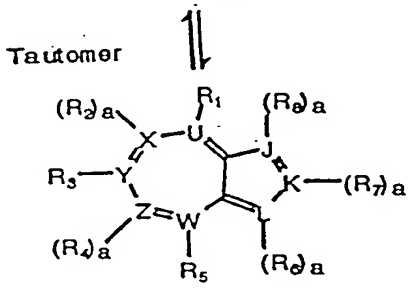


I (C)

wherein:

R_1, R_3 and R_5 are each independently selected from:

NH, NH_2, O, OH, S, and SH;

NH-alkyl, N-alkyl, O-alkyl and S-alkyl wherein the alkyl group is C_1-C_{20};

NH-aryl, O-aryl and S-aryl wherein the aryl group is a substituted or unsubstituted phenyl or heterocyclic group;

R_2, R_4, R_7, and R_8 are independently selected from the group consisting of hydrogen, C_1-C_{20} alkyl, substituted phenyl, unsubstituted phenyl, unsubstituted heterocycle, substituted heterocycle, aralkyl wherein the alkyl containing 1 to 6 carbon atoms and the aryl is substituted or unsubstituted;

R_6 is selected from the group consisting of

hydrogen,

C_1-C_{20} alkyl,

substituted phenyl,

unsubstituted phenyl,

unsubstituted heterocycle,

substituted heterocycle,

aralkyl wherein the alkyl containing 1 to 6 carbon atoms and the aryl is substituted or unsubstituted;

a glycosyl group selected from the group consisting of ribosyl, 2'-deoxyribosyl, 2'3'-dideoxyribosyl, 2'3'-dideoxy-2'-fluororibosyl, 2'3'-dideoxy-3'-fluororibosyl, 2'3'-dideoxy-2'3'-fluororibosyl, 2'3'-dideoxy-3'-azidoribosyl and mono-, di-, and triphosphate derivatives thereof;

$-(CH_2)_{m+n+1}-R'$

$-(CH_2)_m-O-(CH_2)_n-O-R'$;

$-(CH_2)_{m+1}-O-R'$;

$-(CH_2)_m-O-(CH_2)_n-R'$;

wherein R' is selected from the group consisting of: hydrogen, H_2PO_3, $H_3P_2O_6$, $H_4P_3O_9$, and alkali metal or alkaline earth metal salts thereof;

m is zero to 20, n is zero to 20, and a is zero or one;

U, X, Y, Z, W, J, K, and L are selected from the group consisting of C and N;

and all chiral forms and stereoisomers of said compounds.

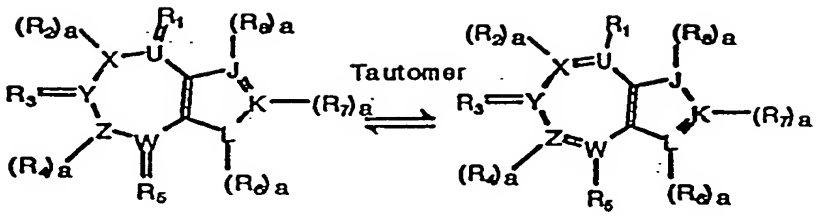
Claim 17. The method of claim 16 wherein said compound is administered subcutaneously, intravenously, intramuscularly, intraperitoneally, orally, topically, or by a combination thereof.

Claim 18. The method of claim 16 wherein said at least one compound is administered

in combination with at least one known therapeutic agent.

Claim 19. The method of claim 16 wherein said compound is in a therapeutic form of a pharmaceutically acceptable salt, phosphonate, ester or salt of said ester, which provides said compound or its therapeutically effective metabolite during said treatment.

Claim 20. A method of inhibiting enzymatic activity of adenosine deaminase and/or guanine deaminase in a patient or vertebrate animal comprising administering to said patient or vertebrate animal in an amount sufficient to effect said inhibition, at least one of potentially planar, aromatic, ring-expanded heterocyclic bases, nucleosides and nucleotide compounds having the structure



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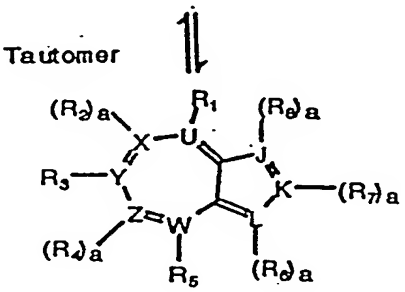


I (C)

wherein:

R_1, R_3 and R_5 are each independently selected from:

NH, NH_2, O, OH, S, and SH;

NH-alkyl, N-alkyl, O-alkyl and S-alkyl wherein the alkyl group is C_1-C_{20};

NH-aryl, O-aryl and S-aryl wherein the aryl group is a substituted or unsubstituted phenyl or heterocyclic group;

R_2, R_4, R_7, and R_8 are independently selected from the group consisting of hydrogen, C_1-C_{20} alkyl, substituted phenyl, unsubstituted phenyl, unsubstituted heterocycle, substituted heterocycle, aralkyl wherein the alkyl containing 1 to 6 carbon atoms and the aryl is substituted or unsubstituted;

R_6 is selected from the group consisting of

hydrogen,

C_1-C_{20} alkyl,

substituted phenyl,

unsubstituted phenyl,

unsubstituted heterocycle,

substituted heterocycle,

aralkyl wherein the alkyl containing 1 to 6 carbon atoms and the aryl is substituted or unsubstituted;

a glycosyl group selected from the group consisting of ribosyl, 2'-deoxyribosyl, 2'3'-dideoxyribosyl, 2'3'-dideoxy-2'-fluororibosyl, 2'3'-dideoxy-3'-fluororibosyl, 2'3'-dideoxy-2'3'-fluororibosyl, 2'3'-dideoxy-3'-azidoribosyl and mono-, di-, and triphosphate derivatives thereof;

$-(CH_2)_{m+n+1}-R'$

$-(CH_2)_m-O-(CH_2)_n-O-R'$;

$-(CH_2)_{m+1}-O-R'$;

$-(CH_2)_m-O-(CH_2)_n-R'$;

wherein R' is selected from the group consisting of: hydrogen, H_2PO_3, $H_3P_2O_6$, $H_4P_3O_9$, and alkali metal or alkaline earth metal salts thereof;

m is zero to 20, n is zero to 20, and a is zero or one;

U, X, Y, Z, W, J, K, and L are selected from the group consisting of C and N;

and all chiral forms and stereoisomers of said compounds.

Claim 21. The method of claim 20 wherein said compound is administered subcutaneously, intravenously, intramuscularly, intraperitoneally, orally, topically, or by a combination thereof.

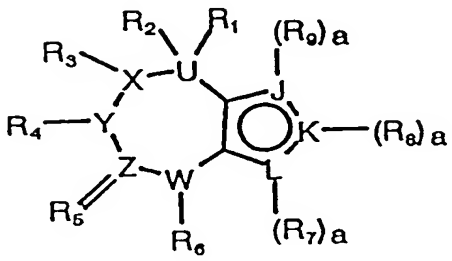
Claim 22. The method of claim 20 wherein said at least one compound is administered in combination with at least one known therapeutic agent.

Claim 23 The method of claim 20 wherein said compound is in a therapeutic form of a pharmaceutically acceptable salt, phosphonate, ester or salt of said ester, which provides said compound or its therapeutically effective metabolite during said treatment.

Claim 24. A method of treating a viral, bacterial, fungal or parasitic infection in a patient or vertebrate animal comprising administering to said patient or vertebrate animal in an amount sufficient to effect said treatment, at least one of compounds comprising non-planar,

non-aromatic, ring-expanded heterocyclic bases, nucleosides or nucleotides having the formula II

Formula II



wherein:

R_1 and R_2 are each independently selected from H, OR_3, SR_3, NHR_3, CO_2R_3, $CONHR_3$, and $CONHNHR_3$, CH_2OR_3, CH_2NHR_3, and CH_2R_3;

R_3, R_4 and R_6 are each independently selected from:

hydrogen, a C_1-C_{20} alkyl group, an aryl group which is a substituted or unsubstituted phenyl or heterocyclic group, and an aralkyl group wherein the aryl and alkyl portions of the group have the meanings given above;

R_5 is selected from the group consisting of O, S and NH; and

R_7, R_8 and R_9 each are independently selected from:

hydrogen, a C_1-C_{20} alkyl group, an aryl group which is a substituted or unsubstituted phenyl or heterocyclic group, and an aralkyl group

wherein the aryl and alkyl portions of the groups have the meanings given above;

a glycosyl group wherein said glycosyl group is selected from the group consisting of ribosyl, 2'-deoxyribosyl, 2'3'-dideoxy-3'-azidoribosyl, 2'3'-dideoxy-2'-fluororiboxyl, 2',3'-dideoxy-3'-fluororibosyl, 2',3'-dideoxy-2',3'-difluororiboxyl, and mono-, di- and triphosphate derivatives thereof; and

$(CH_2)_m$-XR'-$(CH_2)_n$-YR' wherein R' is selected from the group consisting of:

H, H_2, H_2PO_3, $H_3P_2O_6$, $H_4P_3O_9$, and alkali metal or alkaline earth metal salts thereof;

m is zero to 20, n is zero to 20, and a is zero or one;

U, X, Y, Z, W, J, K, and L are selected from the group consisting of C, N, O, P, and S;

and all chiral form and stereoisomers of said compounds.

Claim 25. The method of claim 24 wherein said infection is a virus infection.

Claim 26. The method of claim 24 wherein said viral infection is caused by a virus selected from the group consisting of human immunodeficiency virus, Human B lymphotropic virus, Herpes simplex virus, Varicella-zoster virus, Epstein-Barr virus, necrotic rhinitis,

Malignant catarrh, Allerton virus, Equine herpesviruses, Neurolymphomatosis, Influenza viruses, Parainfluenza viruses, Adenoviruses, Rheovirus, Respiratory syncytial virus, Rhinoviruses, Coxsackie virus, Echo viruses, Epidemic gastroenteritis virus, Rubeola virus, Hepatitis viruses, cytomegalovirus virus and Papovavirus.

Claim 27. The method of claim 24 wherein said viral infection is caused by Hepatitis viruses.

Claim 28. The method of claim 24 wherein said viral infection is caused by Hepatitis B virus.

Claim 29. The method of claim 24 wherein said viral infection is caused by Epstein-Barr virus.

Claim 30. The method of claim 24 wherein said viral infection is caused by cytomegalovirus virus.

Claim 31. The method of claim 24 wherein said compound is administered subcutaneously, intravenously, intramuscularly,

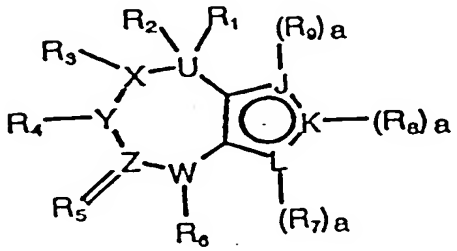
intraperitoneally, orally, topically, or by a combination thereof.

Claim 32. The method of claim 24 wherein said at least one compound is administered in combination with at least one known therapeutic agent.

Claim 33 The method of claim 24 wherein said compound is in a therapeutic form of a pharmaceutically acceptable salt, phosphonate, ester or salt of said ester, which provides said compound or its therapeutically effective metabolite during said treatment.

Claim 34. A method of inhibiting the growth of cancer in a patient or vertebrate animal comprising administering to said patient or vertebrate animal in an amount sufficient to effect said inhibition, at least one of compounds comprising non-planar, non-aromatic, ring-expanded heterocyclic bases, nucleosides or nucleotides having the formula II

Formula II



wherein:

R_1 and R_2 are each independently selected from H, OR_3, SR_3, NHR_3, CO_2R_3, $CONHR_3$, and $CONHNHR_3$, CH_2OR_3, CH_2NHR_3, and CH_2R_3;

R_3, R_4 and R_6 are each independently selected from:

hydrogen, a C_1-C_{20} alkyl group, an aryl group which is a substituted or unsubstituted phenyl or heterocyclic group, and an aralkyl group wherein the aryl and alkyl portions of the group have the meanings given above;

R_5 is selected from the group consisting of O, S and NH; and

R_7, R_8 and R_9 each are independently selected from:

hydrogen, a C_1-C_{20} alkyl group, an aryl group which is a substituted or unsubstituted phenyl or heterocyclic group, and an aralkyl group wherein the aryl and alkyl portions of the groups have the meanings given above;

a glycosyl group wherein said glycosyl group is selected from the group consisting of ribosyl, 2'-deoxyribosyl, 2'3'-dideoxy-3'-azidoribosyl, 2'3'-dideoxy-2'-fluororiboxyl, 2',3'-dideoxy-3'-fluororibosyl, 2',3'-dideoxy-

2',3'-difluororiboxyl, and mono-, di- and triphosphate derivatives thereof; and

$(CH_2)_m$-XR'-$(CH_2)_n$-YR' wherein R' is selected from the group consisting of:

H, H_2, H_2PO_3, $H_3P_2O_6$, $H_4P_3O_9$, and alkali metal or alkaline earth metal salts thereof;

m is zero to 20, n is zero to 20, and a is zero or one;

U, X, Y, Z, W, J, K, and L are selected from the group consisting of C, N, O, P, and S;

and all chiral form and stereoisomers of said compounds.

Claim 35. The method of claim 34 wherein said cancer is selected from the group consisting of leukemia, non-small cell lung cancer, colon cancer, CNS cancer, melanoma, ovarian cancer, renal cancer, prostate cancer and breast cancer.

Claim 36. The method of claim 34 wherein said compound is administered subcutaneously, intravenously, intramuscularly, intraperitoneally, orally, topically, or by a combination thereof.

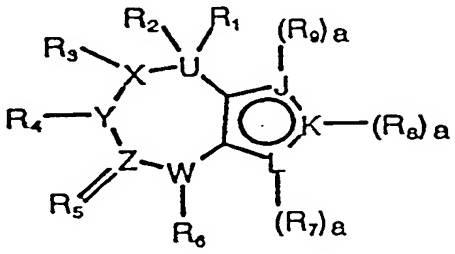
Claim 37. The method of claim 34 wherein said at least one compound is administered

in combination with at least one known therapeutic agent.

Claim 38 The method of claim 34 wherein said compound is in a therapeutic form of a pharmaceutically acceptable salt, phosphonate, ester or salt of said ester, which provides said compound or its therapeutically effective metabolite during said treatment.

Claim 39. A method of inhibiting enzymatic activity of RNA polymerases in a patient or vertebrate animal comprising administering to said patient or vertebrate animal in an amount sufficient to effect said inhibition, at least one of compounds comprising non-planar, non-aromatic, ring-expanded heterocyclic bases, nucleosides or nucleotides having the formula II

Formula II



wherein:

R_1 and R_2 are each independently selected from H, OR_3, SR_3, NHR_3, CO_2R_3, $CONHR_3$, and $CONHNHR_3$, CH_2OR_3, CH_2NHR_3, and CH_2R_3;

R_3, R_4 and R_6 are each independently selected from:

hydrogen, a C_1-C_{20} alkyl group, an aryl group which is a substituted or unsubstituted phenyl or heterocyclic group, and an aralkyl group wherein the aryl and alkyl portions of the group have the meanings given above;

R_5 is selected from the group consisting of O, S and NH; and

R_7, R_8 and R_9 each are independently selected from:

hydrogen, a C_1-C_{20} alkyl group, an aryl group which is a substituted or unsubstituted phenyl or heterocyclic group, and an aralkyl group wherein the aryl and alkyl portions of the groups have the meanings given above;

a glycosyl group wherein said glycosyl group is selected from the group consisting of ribosyl, 2'-deoxyribosyl, 2'3'-dideoxy-3'-azidoribosyl, 2'3'-dideoxy-2'-fluororiboxyl, 2',3'-dideoxy-3'-fluororibosyl, 2',3'-dideoxy-2',3'-difluororiboxyl, and mono-, di- and triphosphate derivatives thereof; and

$(CH_2)_m$-XR'-$(CH_2)_n$-YR' wherein R' is selected from the group consisting of:

H, H_2, H_2PO_3, $H_3P_2O_6$, $H_4P_3O_9$, and alkali metal or alkaline earth metal salts thereof;

m is zero to 20, n is zero to 20, and a is zero or one;

U, X, Y, Z, W, J, K, and L are selected from the group consisting of C, N, O, P, and S;

and all chiral form and stereoisomers of said compounds.

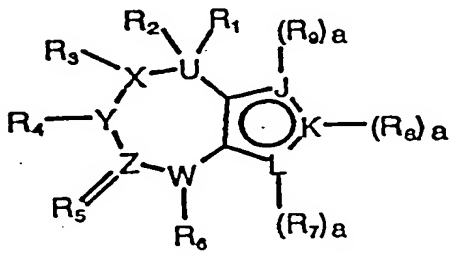
Claim 40. The method of claim 39 wherein said compound is administered subcutaneously, intravenously, intramuscularly, intraperitoneally, orally, topically, or by a combination thereof.

Claim 41. The method of claim 39 wherein said at least one compound is administered in combination with at least one known therapeutic agent.

Claim 42. The method of claim 39 wherein said compound is in a therapeutic form of a pharmaceutically acceptable salt, phosphonate, ester or salt of said ester, which provides said compound or its therapeutically effective metabolite during said treatment.

Claim 43. A method of inhibiting enzymatic activity of adenosine deaminase and guanine deaminase in a patient or vertebrate animal comprising administering to said patient or vertebrate animal in an amount sufficient to effect said inhibition, at least one of compounds comprising non-planar, non-aromatic, ring-expanded heterocyclic bases, nucleosides or nucleotides having the formula II

Formula II



wherein:

R_1 and R_2 are each independently selected from H, OR_3, SR_3, NHR_3, CO_2R_3, $CONHR_3$, and $CONHNHR_3$, CH_2OR_3, CH_2NHR_3, and CH_2R_3;

R_3, R_4 and R_6 are each independently selected from:

hydrogen, a C_1-C_{20} alkyl group, an aryl group which is a substituted or unsubstituted phenyl or heterocyclic group, and an aralkyl group wherein the aryl and alkyl portions of the group have the meanings given above;

R_5 is selected from the group consisting of O, S and NH; and

R_7, R_8 and R_9 each are independently selected from:

hydrogen, a C_1-C_{20} alkyl group, an aryl group which is a substituted or unsubstituted phenyl or heterocyclic group, and an aralkyl group wherein the aryl and alkyl portions of the groups have the meanings given above;

a glycosyl group wherein said glycosyl group is selected from the group consisting of ribosyl, 2'-deoxyribosyl, 2'3'-dideoxy-3'-azidoribosyl, 2'3'-dideoxy-2'-fluororiboxyl, 2',3'-dideoxy-3'-fluororibosyl, 2',3'-dideoxy-2',3'-difluororiboxyl, and mono-, di- and triphosphate derivatives thereof; and

$(CH_2)_m$-XR'-$(CH_2)_n$-YR' wherein R' is selected from the group consisting of:

H, H_2, H_2PO_3, $H_3P_2O_6$, $H_4P_3O_9$, and alkali metal or alkaline earth metal salts thereof;

m is zero to 20, n is zero to 20, and a is zero or one;

U, X, Y, Z, W, J, K, and L are selected from the group consisting of C, N, O, P, and S;

and all chiral form and stereoisomers of said compounds.

Claim 44. The method of claim 43 wherein said compound is administered

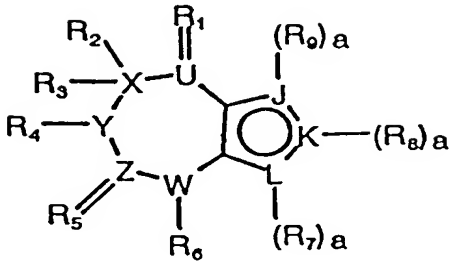
subcutaneously, intravenously, intramuscularly, intraperitoneally, orally, topically, or by a combination thereof.

Claim 45. The method of claim 43 wherein said at least one compound is administered in combination with at least one known therapeutic agent.

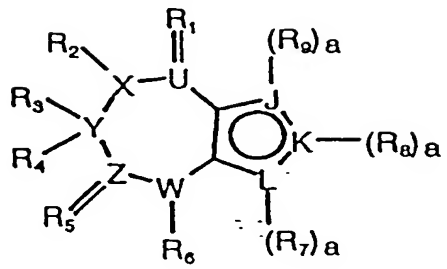
Claim 46 The method of claim 43 wherein said compound is in a therapeutic form of a pharmaceutically acceptable salt, phosphonate, ester or salt of said ester, which provides said compound or its therapeutically effective metabolite during said treatment.

Claim 47. A method of treating a viral, bacterial, fungal or parasitic infection in a patient or vertebrate animal comprising administering to said patient or vertebrate animal in an amount sufficient to effect said treatment, at least one of compounds comprising non-planar, non-aromatic, ring-expanded heterocyclic bases, nucleosides or nucleotides having the following formulas III and IV

Formula III



Formula IV



wherein:

R_1 and R_5 are each independently selected from O, S, and NH;

R_3 and R_4 are each independently selected from H, OR_2, SR_2, NHR_2, CO_2R_2, $CONHR_2$, $CONHNHR_2$, CH_2OR_2, CH_2NHR_2, and CH_2R_2;

R_2, R_4 and R_6 are each independently selected from:

hydrogen, a C_1-C_{20} alkyl group, an aryl group which is a substituted or unsubstituted phenyl or heterocyclic group, and an aralkyl group wherein the aryl and alkyl portions of the group have the meanings given above;

R_7, R_8, and R_9 are each independently selected from:

hydrogen, a C_1-C_{20} alkyl group, an aryl group which is a substituted or unsubstituted phenyl or heterocyclic group, and an aralkyl group wherein the aryl and alkyl portions of the groups have the meanings given above;

a glycosyl group wherein said glycosyl group is selected from the group consisting of ribosyl, 2'-deoxyribosyl, 2'3'-dideoxy-3'-

azidoribosyl, 2',3'-dideoxy-2'-fluororibosyl, 2',3'-dideoxy-3'-fluororibosyl, 2',3'-dideoxy-2'3'-difluororibosyl, and mono-, di-, and triphosphate derivatives thereof;

$(CH_2)_m$-XR'-$(CH_2)_n$-YR' wherein R' is selected from:

hydrogen, H_2PO_3, $H_3P_2O_6$, $H_4P_3O_9$, and alkali metal or alkaline earth metal salts thereof;

m is zero to 20, n is zero to 20, and a is zero or one;

U, X, Y, Z, W, J, K, and L are selected from the group consisting of C, N, O, P, and S;

and all chiral forms and stereoisomers of said compounds.

Claim 48. The method of claim 47 wherein said infection is a virus infection.

Claim 49. The method of claim 47 wherein said viral infection is caused by a virus selected from the group consisting of human immunodeficiency virus, Human B lymphotropic virus, Herpes simplex virus, Varicella-zoster virus, Epstein-Barr virus, necrotic rhinitis, Malignant catarrh, Allerton virus, Equine herpesviruses, Neurolymphomatosis, Influenza viruses, Parainfluenza viruses, Adenoviruses, Rheovirus, Respiratory syncytial virus, Rhinoviruses, Coxsackie virus, Echo viruses,

Epidemic gastroenteritis virus, Rubeola virus, Hepatitis viruses, cytomegalovirus virus and Papovavirus.

Claim 50. The method of claim 47 wherein said viral infection is caused by Hepatitis viruses.

Claim 51. The method of claim 47 wherein said viral infection is caused by Hepatitis B virus.

Claim 52. The method of claim 47 wherein said viral infection is caused by Epstein-Barr virus.

Claim 53. The method of claim 47 wherein said viral infection is caused by cytomegalovirus virus.

Claim 54. The method of claim 47 wherein said compound is administered subcutaneously, intravenously, intramuscularly, intraperitoneally, orally, topically, or by a combination thereof.

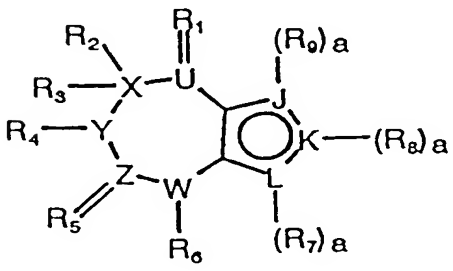
Claim 55. The method of claim 47 wherein said at least one compound is administered

in combination with at least one known therapeutic agent.

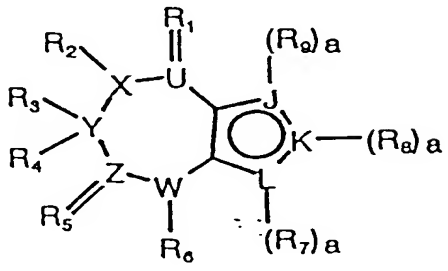
Claim 56. The method of claim 47 wherein said compound is in a therapeutic form of a pharmaceutically acceptable salt, phosphonate, ester or salt of said ester, which provides said compound or its therapeutically effective metabolite during said treatment.

Claim 57. A method of inhibiting the growth of cancer in a patient or vertebrate animal comprising administering to said patient or vertebrate animal in an amount sufficient to effect said inhibition, at least one of compounds comprising non-planar, non-aromatic, ring-expanded heterocyclic bases, nucleosides or nucleotides having the following formulas III and IV

Formula III



Formula IV



wherein:

R_1 and R_5 are each independently selected from O, S, and NH;

R_3 and R_4 are each independently selected from H, OR_2, SR_2, NHR_2, CO_2R_2, $CONHR_2$, $CONHNHR_2$, CH_2OR_2, CH_2NHR_2, and CH_2R_2;

R_2, R_4 and R_6 are each independently selected from:

hydrogen, a C_1-C_{20} alkyl group, an aryl group which is a substituted or unsubstituted phenyl or heterocyclic group, and an aralkyl group wherein the aryl and alkyl portions of the group have the meanings given above;

R_7, R_8, and R_9 are each independently selected from:

hydrogen, a C_1-C_{20} alkyl group, an aryl group which is a substituted or unsubstituted phenyl or heterocyclic group, and an aralkyl group wherein the aryl and alkyl portions of the groups have the meanings given above;

a glycosyl group wherein said glycosyl group is selected from the group consisting of ribosyl, 2'-deoxyribosyl, 2'3'-dideoxy-3'-azidoribosyl, 2',3'-dideoxy-2'-fluororibosyl, 2',3'-dideoxy-3'-fluororibosyl, 2',3'-dideoxy-2'3'-difluororibosyl, and mono-, di-, and triphosphate derivatives thereof;

$(CH_2)_m$-XR'-$(CH_2)_n$-YR' wherein R' is selected from:

hydrogen, H_2PO_3, $H_3P_2O_6$, $H_4P_3O_9$, and alkali metal or alkaline earth metal salts thereof;

m is zero to 20, n is zero to 20, and a is zero or one;

U, X, Y, Z, W, J, K, and L are selected from the group consisting of C, N, O, P, and S;

and all chiral forms and stereoisomers of said compounds.

Claim 58. The method of claim 57 wherein said cancer is selected from the group consisting of leukemia, non-small cell lung cancer, colon cancer, CNS cancer, melanoma, ovarian cancer, renal cancer, prostate cancer and breast cancer.

Claim 59. The method of claim 57 wherein said compound is administered subcutaneously, intravenously, intramuscularly, intraperitoneally, orally, topically, or by a combination thereof.

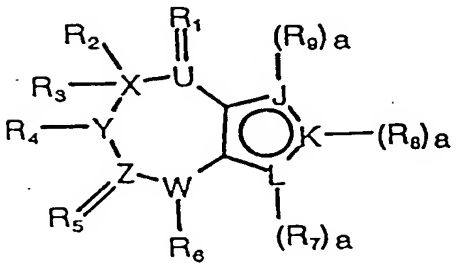
Claim 60. The method of claim 57 wherein said at least one compound is administered in combination with at least one known therapeutic agent.

Claim 61. The method of claim 57 wherein said compound is in a therapeutic form of

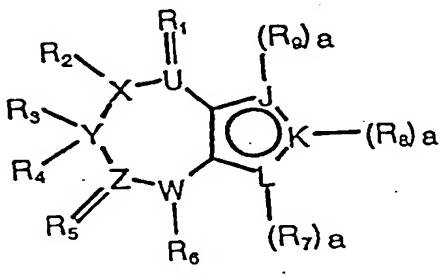
a pharmaceutically acceptable salt, phosphonate, ester or salt of said ester, which provides said compound or its therapeutically effective metabolite during said treatment.

Claim 62. A method of inhibiting enzymatic activity of RNA polymerases in a patient or vertebrate animal comprising administering to said patient or vertebrate animal in an amount sufficient to effect said inhibition, at least one of compounds comprising non-planar, non-aromatic, ring-expanded heterocyclic bases, nucleosides or nucleotides having the following formulas III and IV

Formula III



Formula IV



wherein:

R_1 and R_5 are each independently selected from O, S, and NH;

R_3 and R_4 are each independently selected from H, OR_2, SR_2, NHR_2, CO_2R_2, $CONHR_2$, $CONHNHR_2$, CH_2OR_2, CH_2NHR_2, and CH_2R_2;

R_2, R_4 and R_6 are each independently selected from:

hydrogen, a C_1-C_{20} alkyl group, an aryl group which is a substituted or unsubstituted phenyl or heterocyclic group, and an aralkyl group wherein the aryl and alkyl portions of the group have the meanings given above;

R_7, R_8, and R_9 are each independently selected from:

hydrogen, a C_1-C_{20} alkyl group, an aryl group which is a substituted or unsubstituted phenyl or heterocyclic group, and an aralkyl group wherein the aryl and alkyl portions of the groups have the meanings given above;

a glycosyl group wherein said glycosyl group is selected from the group consisting of ribosyl, 2'-deoxyribosyl, 2'3'-dideoxy-3'-azidoribosyl, 2',3'-dideoxy-2'-fluororibosyl, 2',3'-dideoxy-3'-fluororibosyl, 2',3'-dideoxy-2'3'-difluororibosyl, and mono-, di-, and triphosphate derivatives thereof;

$(CH_2)_m$-XR'-$(CH_2)_n$-YR' wherein R' is selected from:

hydrogen, H_2PO_3, $H_3P_2O_6$, $H_4P_3O_9$, and alkali metal or alkaline earth metal salts thereof;

m is zero to 20, n is zero to 20, and a is zero or one;

U, X, Y, Z, W, J, K, and L are selected from the group consisting of C, N, O, P, and S;

and all chiral forms and stereoisomers of said compounds.

Claim 63. The method of claim 62 wherein said compound is administered subcutaneously, intravenously, intramuscularly, intraperitoneally, orally, topically, or by a combination thereof.

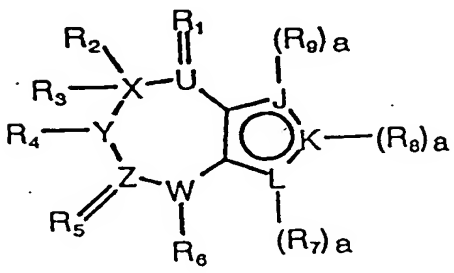
Claim 64. The method of claim 62 wherein said at least one compound is administered in combination with at least one known therapeutic agent.

Claim 65. The method of claim 62 wherein said compound is in a therapeutic form of a pharmaceutically acceptable salt, phosphonate, ester or salt of said ester, which provides said compound or its therapeutically effective metabolite during said treatment.

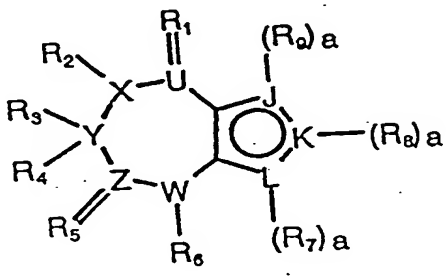
Claim 66. A method of inhibiting enzymatic activity of adenosine deaminase and guanine deaminase in a patient or vertebrate

animal comprising administering to said patient or vertebrate animal in an amount sufficient to effect said inhibition, at least one of compounds comprising non-planar, non-aromatic, ring-expanded heterocyclic bases, nucleosides or nucleotides having the following formulas III and IV

Formula III



Formula IV



wherein:

R_1 and R_5 are each independently selected from O, S, and NH;

R_3 and R_4 are each independently selected from H, OR_2, SR_2, NHR_2, CO_2R_2, $CONHR_2$, $CONHNHR_2$, CH_2OR_2, CH_2NHR_2, and CH_2R_2;

R_2, R_4 and R_6 are each independently selected from:

hydrogen, a C_1-C_{20} alkyl group, an aryl group which is a substituted or unsubstituted phenyl or heterocyclic group, and an aralkyl group wherein the aryl and alkyl portions of the group have the meanings given above;

R_7, R_8, and R_9 are each independently selected from:

hydrogen, a C_1-C_{20} alkyl group, an aryl group which is a substituted or unsubstituted phenyl or heterocyclic group, and an aralkyl group wherein the aryl and alkyl portions of the groups have the meanings given above;

a glycosyl group wherein said glycosyl group is selected from the group consisting of ribosyl, 2'-deoxyribosyl, 2'3'-dideoxy-3'-azidoribosyl, 2',3'-dideoxy-2'-fluororibosyl, 2',3'-dideoxy-3'-fluororibosyl, 2',3'-dideoxy-2'3'-difluororibosyl, and mono-, di-, and triphosphate derivatives thereof;

$(CH_2)_m$-XR'-$(CH_2)_n$-YR' wherein R' is selected from:

hydrogen, H_2PO_3, $H_3P_2O_6$, $H_4P_3O_9$, and alkali metal or alkaline earth metal salts thereof;

m is zero to 20, n is zero to 20, and a is zero or one;

U, X, Y, Z, W, J, K, and L are selected from the group consisting of C, N, O, P, and S;

and all chiral forms and stereoisomers of said compounds.

Claim 67. The method of claim 66 wherein said compound is administered subcutaneously, intravenously, intramuscularly,

intraperitoneally, orally, topically, or by a combination thereof.

Claim 68. The method of claim 66 wherein said at least one compound is administered in combination with at least one known therapeutic agent.

Claim 69. The method of claim 66 wherein said compound is in a therapeutic form of a pharmaceutically acceptable salt, phosphonate, ester or salt of said ester, which provides said compound or its therapeutically effective metabolite during said treatment.

Claim 70. A method of treating Hepatitis B in a patient or vertebrate animal comprising administering the following compound to said patient or vertebrate animal in an amount sufficient to effect said treatment, 6-imino-6H-1-β-D-ribofuranosyl-4,5,7,8-tetrahydroimidazo[4,5-e][1,3]diazepine-4,8-dione.

Claim 71. The method of claim 70 wherein said compound is administered subcutaneously, intravenously, intramuscularly, intraperitoneally, orally, topically, or by a combination thereof.

Claim 72. The method of claim 70 wherein said compound is administered in combination with at least one known therapeutic agent.

Claim 73. The method of claim 70 wherein said compound is in a therapeutic form of a pharmaceutically acceptable salt, phosphonate, ester or salt of said ester, which provides said compound or its therapeutically effective metabolite during said treatment.

Claim 74. A method of treating Hepatitis B in a patient or vertebrate animal comprising administering the following compound to said patient or vertebrate animal in an amount sufficient to effect said treatment, 4,8-Diamino-6*H*-6-imino-1-β-D-ribofuranosylimidazo[4,5-e][1,3]diazepine.

Claim 75. The method of claim 74 wherein said compound is administered subcutaneously, intravenously, intramuscularly, intraperitoneally, orally, topically, or by a combination thereof.

Claim 76. The method of claim 74 wherein said compound is administered in combination with at least one known therapeutic agent.

Claim 77. The method of claim 74 wherein said compound is in a therapeutic form of a pharmaceutically acceptable salt, phosphonate, ester or salt of said ester, which provides said compound or its therapeutically effective metabolite during said treatment.